

ETHYLENE OXIDE EMISSIONS ESTIMATES

Constants

Ethylene Oxide Molecular Weight	44.05 lb/lb-mol
Assumed Ambient Pressure	14.696 psia
Universal Gas Constant	10.73 psia-ft ³ / lbmol-degR
Temperature Conversion (F to R)	459.67 plus temperature in units of deg. F
Mass Conversion	453.6 grams per pound

Exhaust Calculations

Ethylene Oxide Concentration [ppmv]	Exhaust Flow [acf m]	Exhaust Temperature [deg. F]	Period of Exhaust [min]	Exhaust Temperature [deg R]	Ethylene Oxide Emission Rate [lbs/min]	Ethylene Oxide Emissions [lbs]	Ethylene Oxide Emissions [g]
0.3495	5,156	105	2	564.7	1.93E-04	3.85E-04	0.17
3.1815	5,156	105	20	564.7	1.75E-03	3.51E-02	15.90
3.4555	5,156	105	21	564.7	1.90E-03	4.00E-02	18.13
2.9785	5,156	105	20	564.7	1.64E-03	3.28E-02	14.89
6.343	5,156	105	20	564.7	3.49E-03	6.99E-02	31.70
3.403	5,156	105	20	564.7	1.87E-03	3.75E-02	17.01
2.9085	5,156	105	21	564.7	1.60E-03	3.36E-02	15.26
2.8	5,156	105	20	564.7	1.54E-03	3.08E-02	13.99
2.822	5,156	105	25	564.7	1.55E-03	3.89E-02	17.63
2.729	5,156	105	20	564.7	1.50E-03	3.01E-02	13.64
3.895	5,156	105	20	564.7	2.15E-03	4.29E-02	19.47
3.692	5,156	105	20	564.7	2.03E-03	4.07E-02	18.45
3.5715	5,156	105	21	564.7	1.97E-03	4.13E-02	18.74
3.2425	5,156	105	20	564.7	1.79E-03	3.57E-02	16.20
2.0925	5,156	105	20	564.7	1.15E-03	2.31E-02	10.46
1.832	5,156	105	21	564.7	1.01E-03	2.12E-02	9.61
1.8625	5,156	105	20	564.7	1.03E-03	2.05E-02	9.31
1.6365	5,156	105	21	564.7	9.02E-04	1.89E-02	8.59
1.982	5,156	105	20	564.7	1.09E-03	2.18E-02	9.91
1.6825	5,156	105	20	564.7	9.27E-04	1.85E-02	8.41
1.788	5,156	105	20	564.7	9.85E-04	1.97E-02	8.94
1.5915	5,156	105	20	564.7	8.77E-04	1.75E-02	7.95
1.536	5,156	105	21	564.7	8.46E-04	1.78E-02	8.06
1.5765	5,156	105	20	564.7	8.68E-04	1.74E-02	7.88
1.35	5,156	105	20	564.7	7.44E-04	1.49E-02	6.75
1.1105	5,156	105	21	564.7	6.12E-04	1.28E-02	5.83
1.101	5,156	105	20	564.7	6.07E-04	1.21E-02	5.50
1.3145	5,156	105	20	564.7	7.24E-04	1.45E-02	6.57
1.1115	5,156	105	20	564.7	6.14E-04	1.23E-02	5.57
1.072	5,156	105	21	564.7	5.91E-04	1.24E-02	5.63
1.142	5,156	105	20	564.7	6.29E-04	1.26E-02	5.71

0.905	5,156	105	20	564.7	4.99E-04	9.97E-03	4.52
0.9315	5,156	105	21	564.7	5.13E-04	1.08E-02	4.89
0.799	5,156	105	24	564.7	4.40E-04	1.06E-02	4.79
0.837	5,156	105	21	564.7	4.61E-04	9.68E-03	4.39
0.796	5,156	105	20	564.7	4.39E-04	8.77E-03	3.98
0.7745	5,156	105	20	564.7	4.27E-04	8.53E-03	3.87
0.7395	5,156	105	21	564.7	4.07E-04	8.56E-03	3.88
0.64	5,156	105	20	564.7	3.53E-04	7.05E-03	3.20
0.7215	5,156	105	20	564.7	3.97E-04	7.95E-03	3.61
0.6835	5,156	105	20	564.7	3.77E-04	7.53E-03	3.42
0.6335	5,156	105	21	564.7	3.49E-04	7.33E-03	3.32
0	5,156	105	392	564.7	0.00E+00	0.00E+00	0.00
Total:				4.39E-02	0.894	405.72	

ETHYLENE OXIDE EMISSIONS ESTIMATES

Constants

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Assumed Ambient Pressure	14.696 psia
Universal Gas Constant	10.73 psia-ft ³ / lbmol-degR
Temperature Conversion (F to R)	459.67 plus temperature in units of deg. F
Mass Conversion	453.6 grams per pound

Exhaust Calculations

Ethylene Oxide Concentration [ppmv]	Exhaust Flow [acf m]	Exhaust Temperature [deg. F]	Period of Exhaust [min]	Exhaust Temperature [deg R]	Ethylene Oxide Emission Rate [lbs/min]	Ethylene Oxide Emissions [lbs]	Ethylene Oxide Emissions [g]	
3.1715	5,156	105	19	564.7	1.75E-03	3.32E-02	15.06	
Total:						1.75E-03	0.033	15.06

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Mass Converstion	453.6 grams per pound

Exhaust Calculations

Ethylene Oxide Concentration [ppmv]	Exhaust Flow [acf m]	Exhaust Temperature [deg. F]	Period of Exhaust [min]	Exhaust Temperature [deg R]	Ethylene Oxide Emission Rate [lbs/min]	Ethylene Oxide Emissions [lbs]	Ethylene Oxide Emissions [g]
1.68	5,156	105	15	564.7	9.25E-04	1.39E-02	6.30
1.52	5,156	105	19	564.7	8.37E-04	1.59E-02	7.22
1.53	5,156	105	9	564.7	8.43E-04	7.59E-03	3.44
0.83	5,156	105	20	564.7	4.57E-04	9.14E-03	4.15
0.51	5,156	105	19	564.7	2.81E-04	5.34E-03	2.42
Total:					3.34E-03	0.052	23.52

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Mass Converstion	453.6 grams per pound

Exhaust Calculations

Ethylene Oxide Concentration [ppmv]	Exhaust Flow [acf m]	Exhaust Temperature [deg. F]	Period of Exhaust [min]	Exhaust Temperature [deg R]	Ethylene Oxide Emission Rate [lbs/min]	Ethylene Oxide Emissions [lbs]	Ethylene Oxide Emissions [g]
4.228	5,156	105	14	564.7	2.33E-03	3.26E-02	14.79
3.8665	5,156	105	6	564.7	2.13E-03	1.28E-02	5.80
Total:				4.46E-03	0.045	20.59	

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Mass Conversion	453.6 grams per pound

Exhaust Calculations

Ethylene Oxide Concentration [ppmv]	Exhaust Flow [acf m]	Exhaust Temperature [deg. F]	Period of Exhaust [min]	Exhaust Temperature [deg R]	Ethylene Oxide Emission Rate [lbs/min]	Ethylene Oxide Emissions [lbs]	Ethylene Oxide Emissions [g]
0.719	5,156	105	10	564.7	3.96E-04	3.96E-03	1.80
Total:				3.96E-04	0.004	1.80	

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Temperature Conversion (F to R)	459.67 plus temperature in units of deg. F
Mass Converstion	453.6 grams per pound

Exhaust Calculations

Ethylene Oxide Concentration [ppmv]	Exhaust Flow [acf m]	Exhaust Temperature [deg. F]	Period of Exhaust [min]	Exhaust Temperature [deg R]	Ethylene Oxide Emission Rate [lbs/min]	Ethylene Oxide Emissions [lbs]	Ethylene Oxide Emissions [g]
5	5,156	105	5	564.7	2.75E-03	1.38E-02	6.25
Total:				2.75E-03	0.014	6.25	

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Temperature Conversion (F to R)	459.67 plus temperature in units of deg. F
Mass Converstion	453.6 grams per pound

Exhaust Calculations

Ethylene Oxide Concentration [ppmv]	Exhaust Flow [acf m]	Exhaust Temperature [deg. F]	Period of Exhaust [min]	Exhaust Temperature [deg R]	Ethylene Oxide Emission Rate [lbs/min]	Ethylene Oxide Emissions [lbs]	Ethylene Oxide Emissions [g]
0.43	5,156	105	20	564.7	2.37E-04	4.74E-03	2.15
Total:				2.37E-04	0.005	2.15	

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Mass Conversion	453.6 grams per pound

Exhaust Calculations

Ethylene Oxide Concentration [ppmv]	Exhaust Flow [acf m]	Exhaust Temperature [deg. F]	Period of Exhaust [min]	Exhaust Temperature [deg R]	Ethylene Oxide Emission Rate [lbs/min]	Ethylene Oxide Emissions [lbs]	Ethylene Oxide Emissions [g]
1.07	5,156	105	4	564.7	5.89E-04	2.36E-03	1.07
1.11	5,156	105	19	564.7	6.11E-04	1.16E-02	5.27
0.79	5,156	105	20	564.7	4.35E-04	8.70E-03	3.95
0.62	5,156	105	14	564.7	3.42E-04	4.78E-03	2.17
0.63	5,156	105	7	564.7	3.47E-04	2.43E-03	1.10
0.57	5,156	105	18	564.7	3.14E-04	5.65E-03	2.56
0.57	5,156	105	13	564.7	3.14E-04	4.08E-03	1.85
Total:				2.95E-03	0.040	17.97	

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Mass Converstion	453.6 grams per pound

Exhaust Calculations

Ethylene Oxide Concentration [ppmv]	Exhaust Flow [acf m]	Exhaust Temperature [deg. F]	Period of Exhaust [min]	Exhaust Temperature [deg R]	Ethylene Oxide Emission Rate [lbs/min]	Ethylene Oxide Emissions [lbs]	Ethylene Oxide Emissions [g]
1.26	5,156	105	5	564.7	6.94E-04	3.47E-03	1.57
1.02	5,156	105	17	564.7	5.62E-04	9.55E-03	4.33
0.92	5,156	105	20	564.7	5.07E-04	1.01E-02	4.60
1.07	5,156	105	1	564.7	5.89E-04	5.89E-04	0.27
Total:				2.35E-03	0.024	10.77	

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Exhaust Calculations

Ethylene Oxide Concentration [ppmv]	Exhaust Flow [acf m]	Exhaust Temperature [deg. F]	Period of Exhaust [min]	Exhaust Temperature [deg R]	Ethylene Oxide Emission Rate [lbs/min]	Ethylene Oxide Emissions [lbs]	Ethylene Oxide Emissions [g]
1.6	5,156	105	16	564.7	8.81E-04	1.41E-02	6.40
1.76	5,156	105	13	564.7	9.70E-04	1.26E-02	5.72
Total:				1.85E-03	0.027	12.11	

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4.99	5,156	105	9	564.7	2.75E-03	2.47E-02	11.22
4.8	5,156	105	19	564.7	2.64E-03	5.02E-02	22.79
4.24	5,156	105	20	564.7	2.34E-03	4.67E-02	21.19
3.94	5,156	105	1	564.7	2.17E-03	2.17E-03	0.98
Total:				9.90E-03	0.124	56.19	

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Exhaust Calculations

Ethylene Oxide Concentration [ppmv]	Exhaust Flow [acf m]	Exhaust Temperature [deg. F]	Period of Exhaust [min]	Exhaust Temperature [deg R]	Ethylene Oxide Emission Rate [lbs/min]	Ethylene Oxide Emissions [lbs]	Ethylene Oxide Emissions [g]
0.33	5,156	105	19	564.7	1.82E-04	3.45E-03	1.57
0.74	5,156	105	8	564.7	4.08E-04	3.26E-03	1.48
0.74	5,156	105	10	564.7	4.08E-04	4.08E-03	1.85
3.68	5,156	105	19	564.7	2.03E-03	3.85E-02	17.47
1.65	5,156	105	20	564.7	9.09E-04	1.82E-02	8.25
2.7	5,156	105	13	564.7	1.49E-03	1.93E-02	8.77
Total:				5.42E-03	0.087	39.38	

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0	5,156	105	6	564.7	0.00E+00	0.00E+00	0.00
1.74	5,156	105	20	564.7	9.59E-04	1.92E-02	8.70
2.14	5,156	105	2	564.7	1.18E-03	2.36E-03	1.07
Total:				2.14E-03	0.022	9.77	

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Ethylene Oxide Concentration [ppmv]	Exhaust Flow [acf m]	Exhaust Temperature [deg. F]	Period of Exhaust [min]	Exhaust Temperature [deg R]	Ethylene Oxide Emission Rate [lbs/min]
2.79	5,156	105	16	564.7	1.54E-03
2.73	5,156	105	20	564.7	1.50E-03
2.65	5,156	105	2	564.7	1.46E-03
1.11	5,156	105	20	564.7	6.11E-04
1.03	5,156	105	7	564.7	5.67E-04
				459.7	0.00E+00
				459.7	0.00E+00
				459.7	0.00E+00
				459.7	0.00E+00
				459.7	0.00E+00
				459.7	0.00E+00
				459.7	0.00E+00
				459.7	0.00E+00
Total:					5.68E-03

Ethylene Oxide Emissions [lbs]	Ethylene Oxide Emissions [g]
2.46E-02	11.15
3.01E-02	13.64
2.92E-03	1.32
1.22E-02	5.55
3.97E-03	1.80
0.00E+00	0.00
0.074	33.47

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Ethylene Oxide Emissions [lbs]	Ethylene Oxide Emissions [g]
3.93E-03	1.78
3.65E-02	16.55
0.00E+00	0.00
0.040	18.34